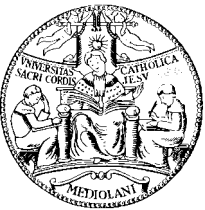
NEUROCHIRURGIA FUNZIONALE E SPINALE
POLICLINICO A. GEMELLI
UNIVERSITA' CATTOLICA
ROMA

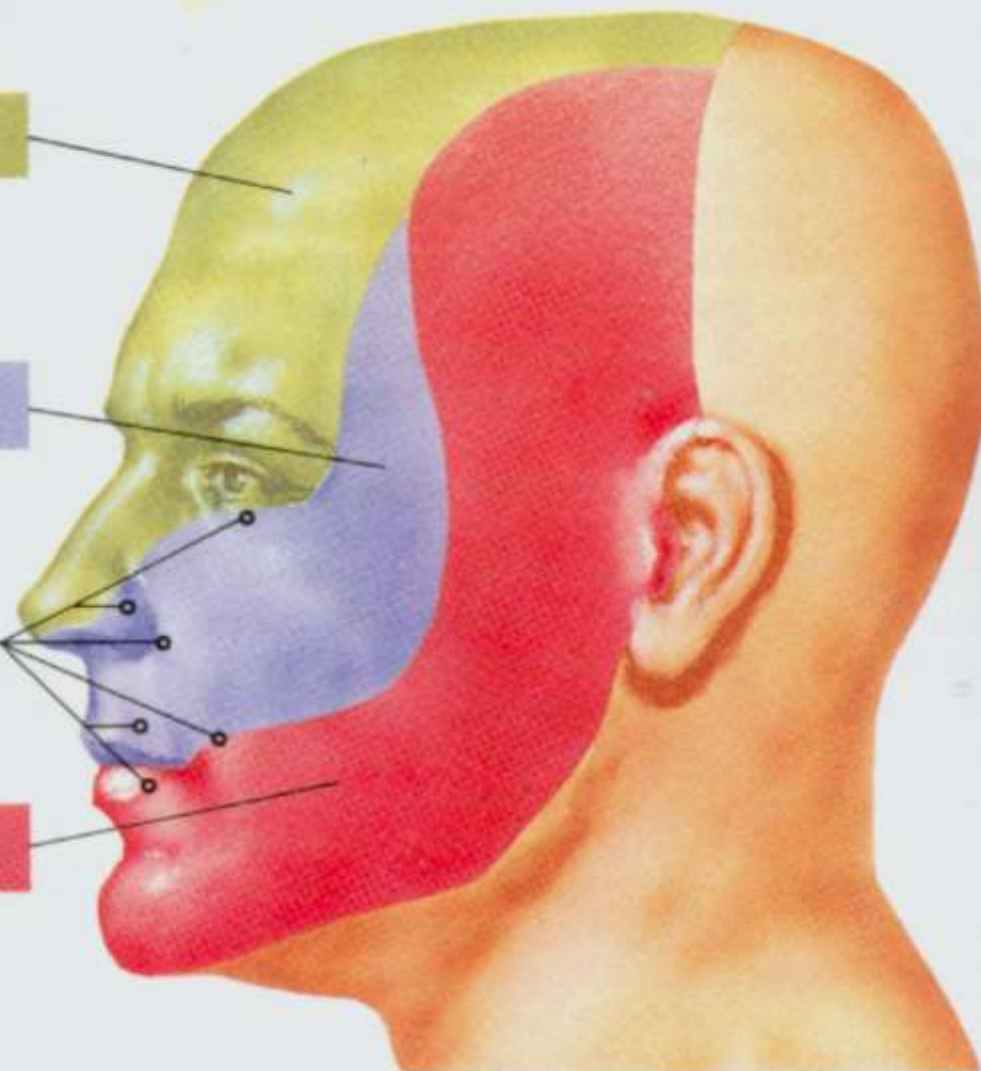
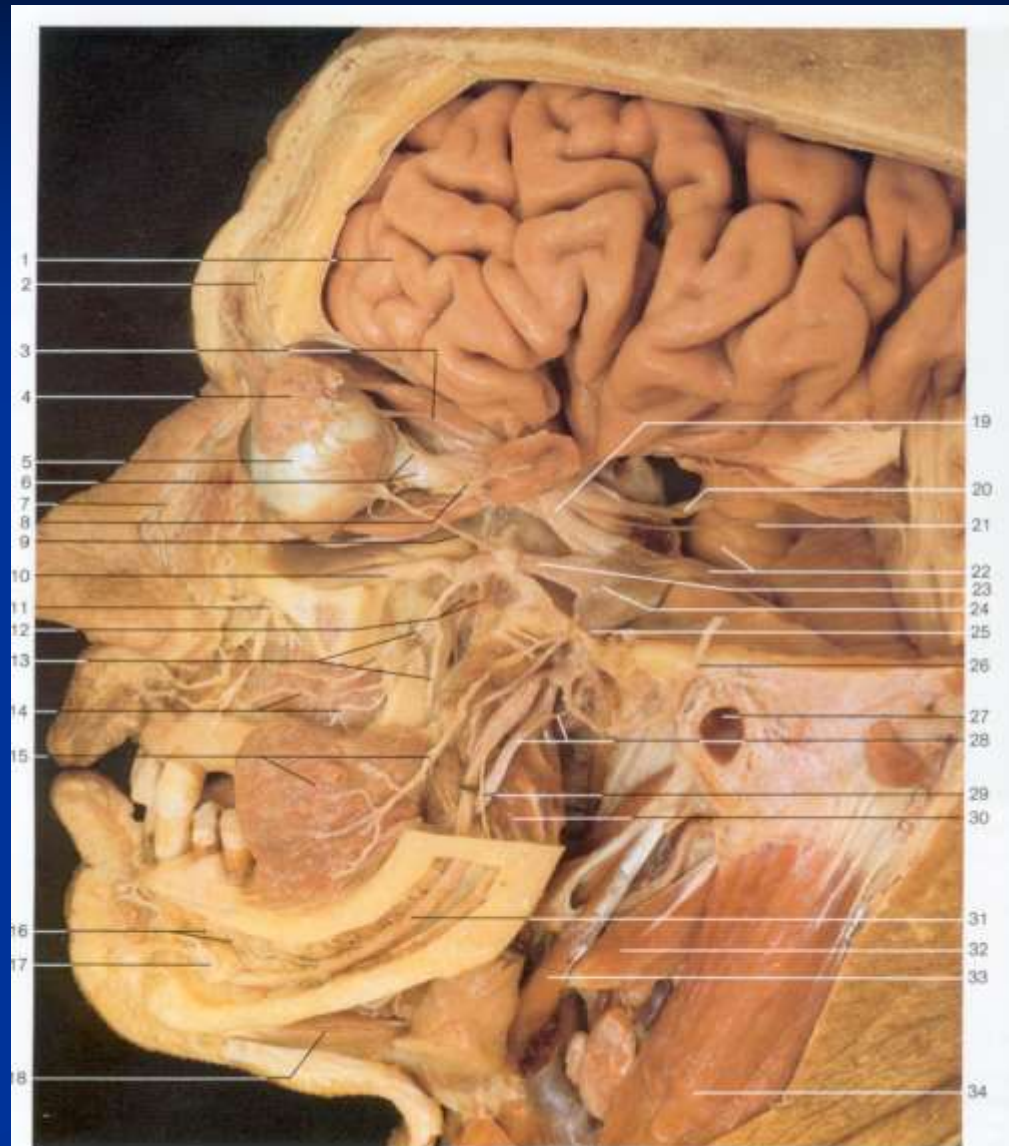
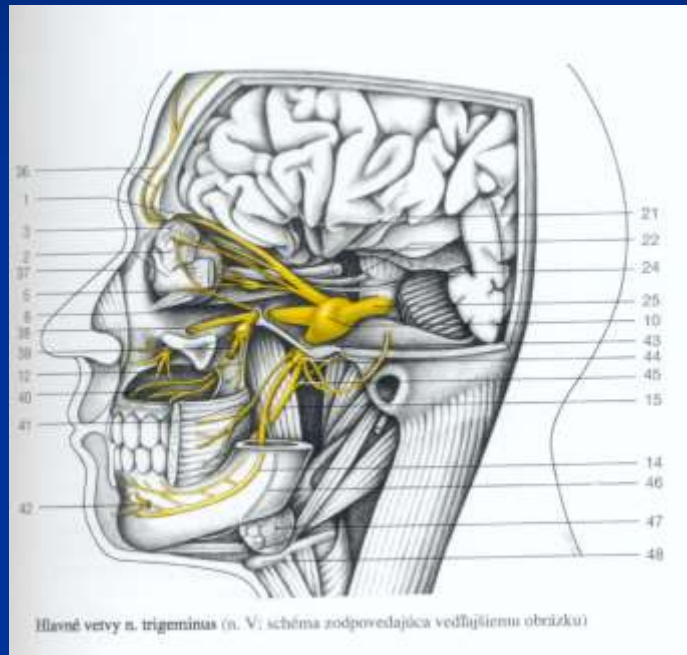
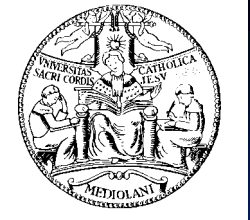
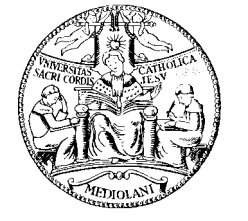
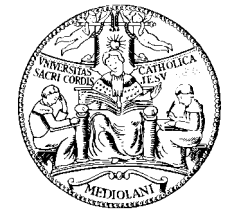
TERAPIA CHIRURGICA DELLA NEVRALGIA DEL TRIGEMINO

M. MEGLIO

territori di innervazione cutanea delle branche del nervo trigemino, dove può localizzarsi il dolore in una nevralgia trigeminale

territorio del nervo oftalmico

territorio del nervo mascellare

comuni zone "trigger"

territorio del nervo mandibolare

Mozgové nervy v spojení s mozgovým kmeňom (pohľad zľava zhora). Ľavá polovica klenby lebky a mozgová hemisféra čiastočne odstránené. Zreteľná poloha ganglion trigeminale

Superior petrosal sinus

Nerve V

Cone of myelin

Pons

Ala of cerebellum

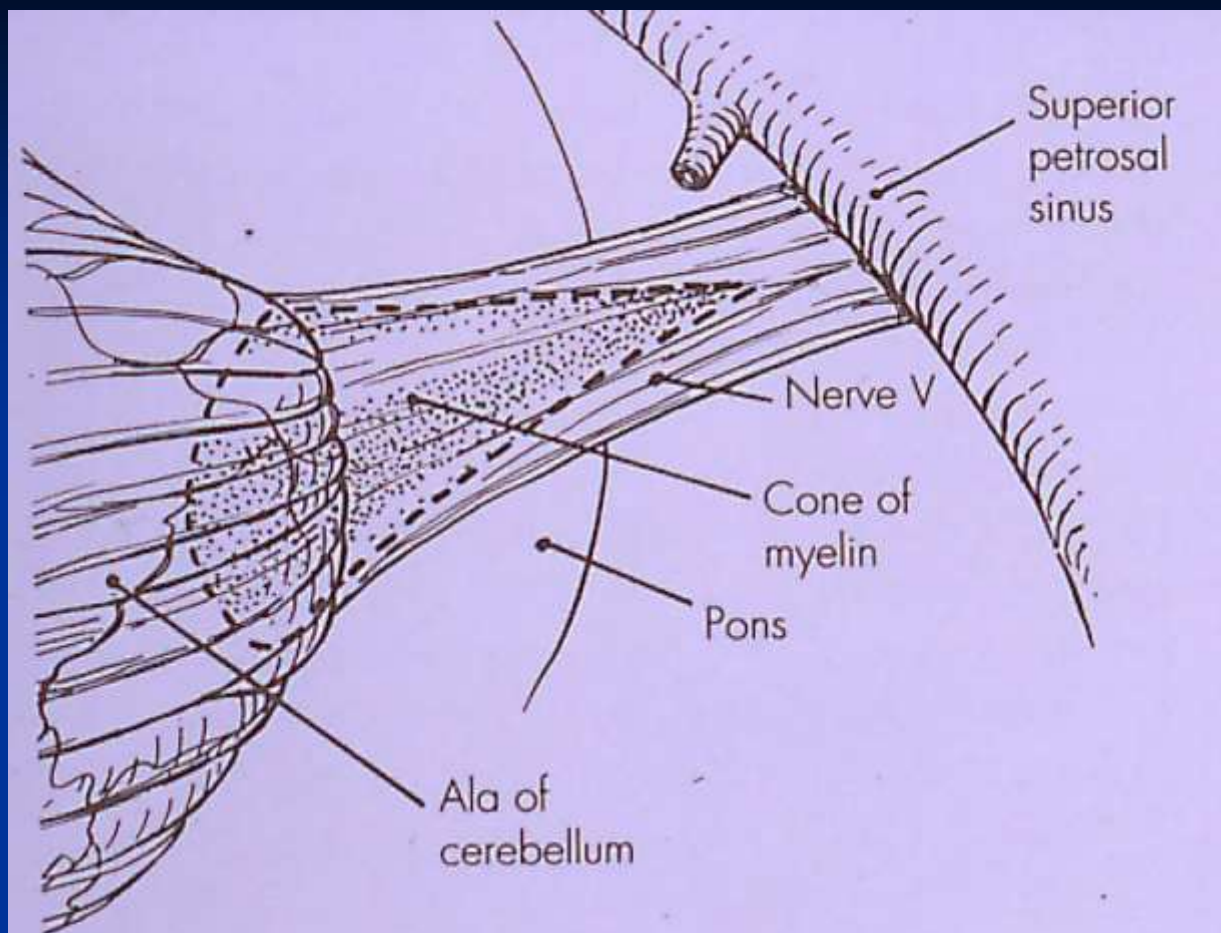
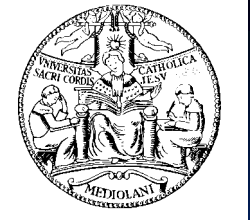



Figure 78-3. Central myelin extends a considerable distance from the nerve. This implies that the junctional area of central and peripheral myelin can be at or near the area of Meckel's cave. The nerve is protected on the rostral-anterior aspect by the motor-proprioceptor fascicle.

corpi genicolati laterale e mediale del talamo sinistro
setto pellucido
corpo calloso
aa. cerebrali anteriori
fessura longitudinale (interemisferica)
teste dei nuclei caudati
aa. talamo-genicolate
aa. lenticolo-striate mediali e laterali
a. corioidea anteriore
a. cerebrale anteriore
n. ottico (II) e a. oftalmica
a. cerebrale media
aa. talamoperforanti
a. comunicante posteriore
a. carotide interna sinistra
a. cerebellare superiore
a. basilare
rami pontini
a. uditiva interna (labirintica)
a. cerebellare infero-anteriore
a. cerebellare infero-posteriore
ramo meningeo anteriore dell'a. vertebrale
a. vertebrale sinistra
a. spinale anteriore
IV
V
VIII
VI
VII
IX
X
XI
destro
sinistro
plessi corioidei dei ventricoli laterali
corno posteriore del ventricolo laterale destro
pulvinar destro e sinistro
splenio del corpo calloso
a. pericallosa posteriore destra
rami parieto-occipitale e calcarino dell'a. cerebrale posteriore destra
tubercolo quadrigemino superiore sinistro
a. vermiana superiore
a. corioidea postero-mediale (per il plesso corioideo del 3° ventricolo)
a. corioidea postero-laterale
a. cerebrale posteriore sinistra con rami temporali anteriore e posteriore
ramo marginale laterale dell'a. cerebellare superiore
a. vermiana inferiore (in trasparenza)
punto corioideo e a. corioidea per il 4° ventricolo
rami tonsillo-emisferici
confini del 4° ventricolo (linea tratteggiata)
ramo meningeo posteriore dell'a. vertebrale
a. spinale posteriore sinistra

III
V_1
V_2
P.C.A.
B.A.
VI
V_3
IV
V
S.C.A.
Ridge
VI
Pons
A.I.C.A.
Cerebellum
VII
VIII
IX
X
X
Medulla
P.I.C.A.

A

B

C

d

FIG. 2. Tissue disorganization in a trigeminal root biopsy specimen. **(A)** Many of the axons in this micrograph show swelling and myelin delamination with expansion of interlamellar spaces (e.g., lower left). Others have been stripped of myelin, whereas a few are relatively intact (e.g., the axons sectioned longitudinally near the upper left). **(B)** A longitudinally sectioned axon undergoing demyelination. The far-right portion of the myelin has been stripped, leaving debris vacuoles (liposomes, arrow), but some compact myelin remains on the left portion. **(C)** A transition zone showing nearly complete demyelination on the left, with numerous closely apposed demyelinated axons (d). On the right, fibers show dysmyelination, including axonal swelling and loosening of myelin lamellae (delamination). Scalebars in **A** and **C** = 5 μm, **B** = 2 μm.

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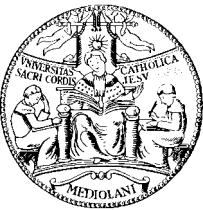
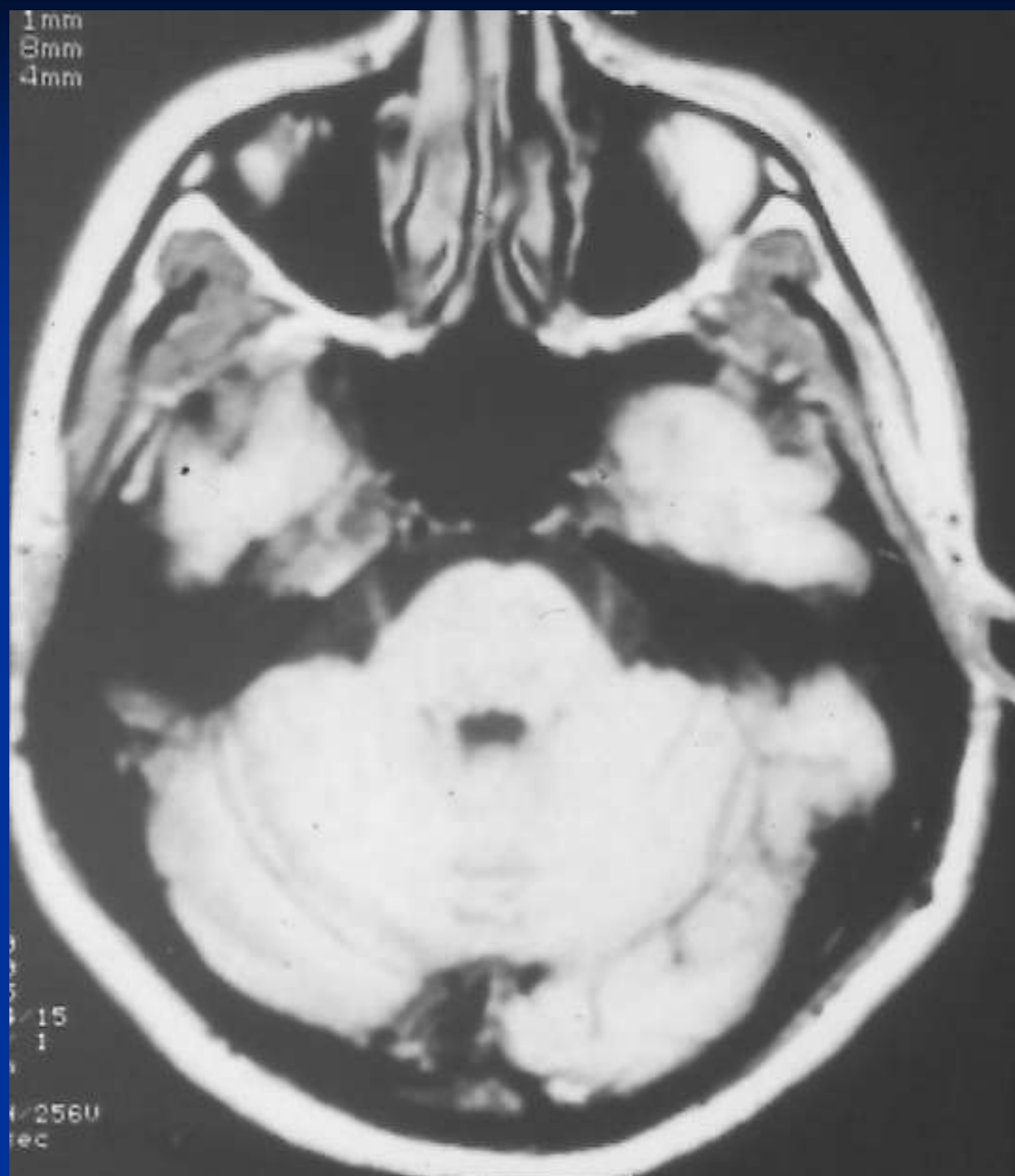
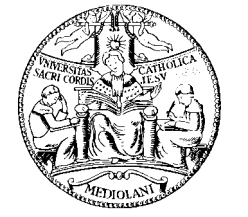
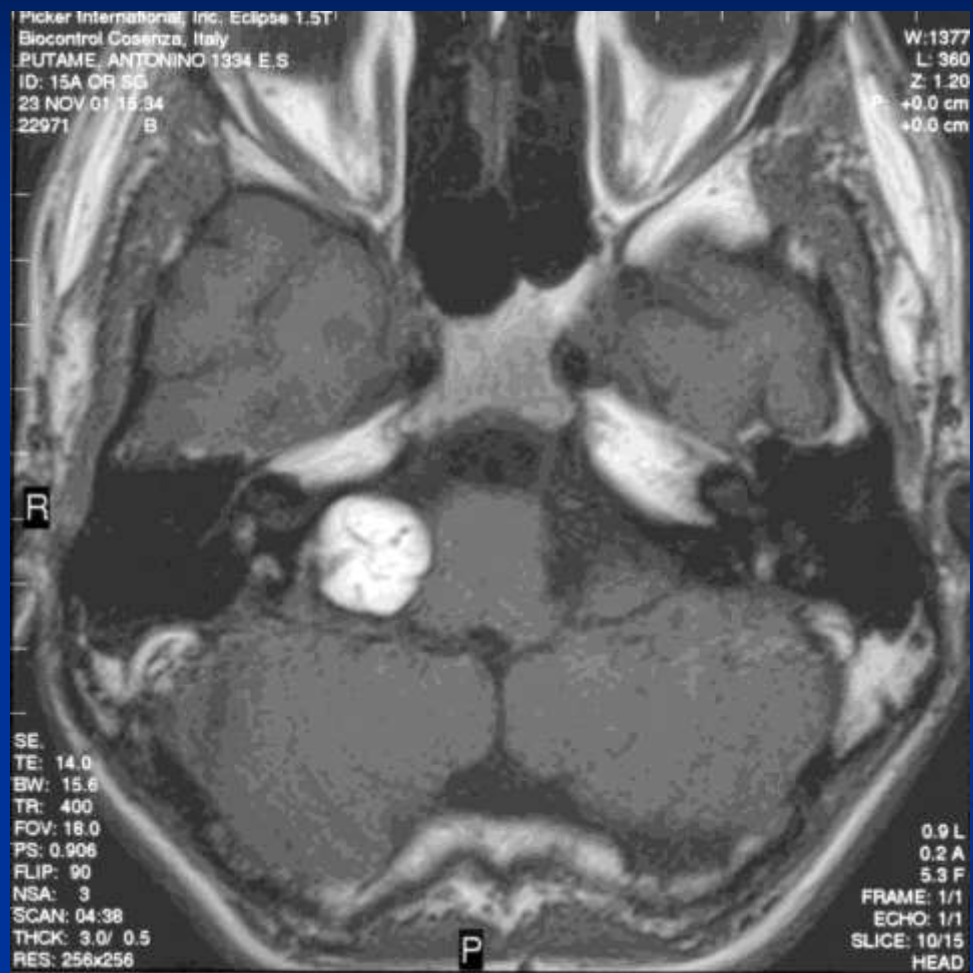
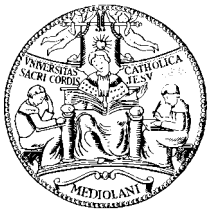
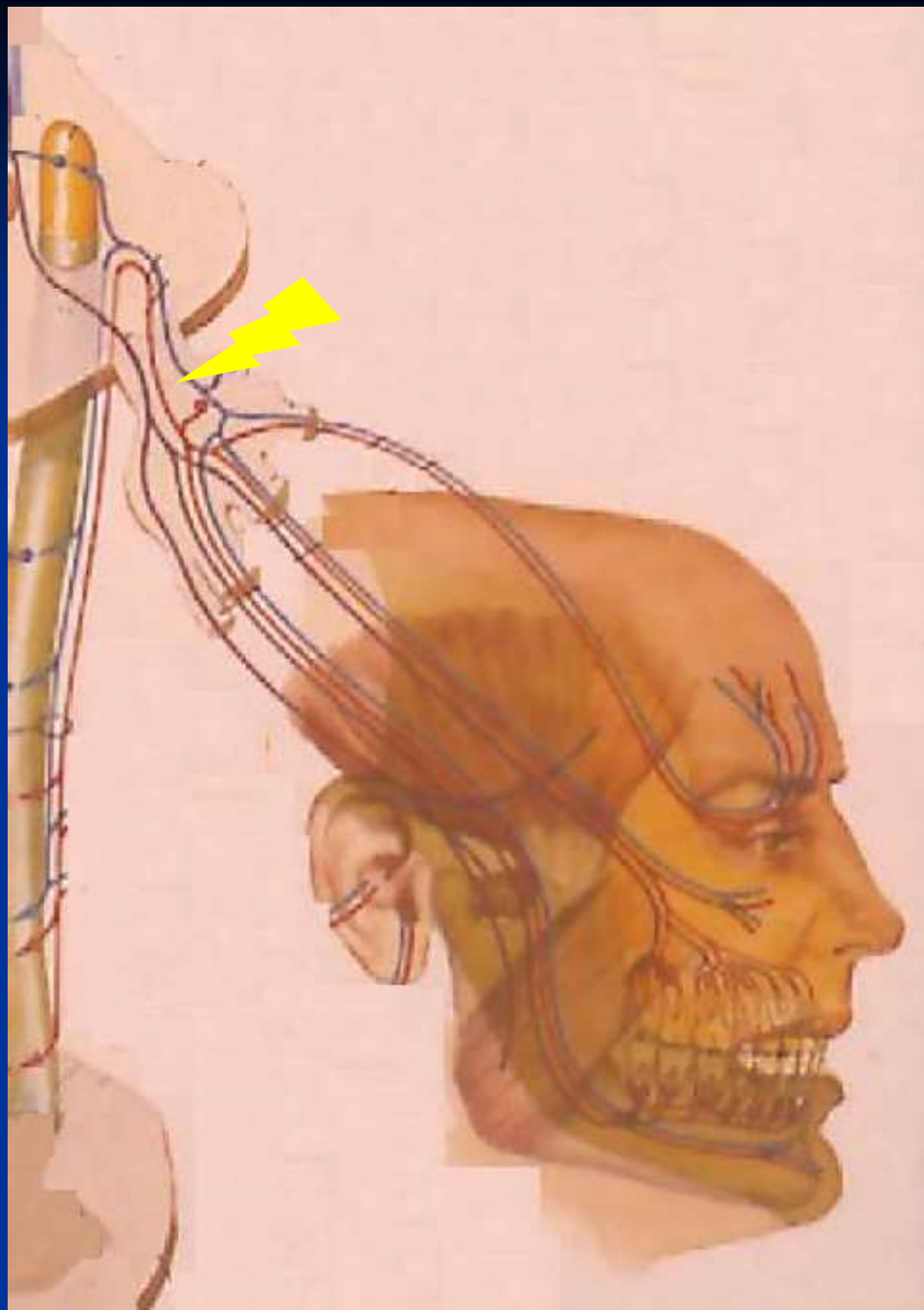
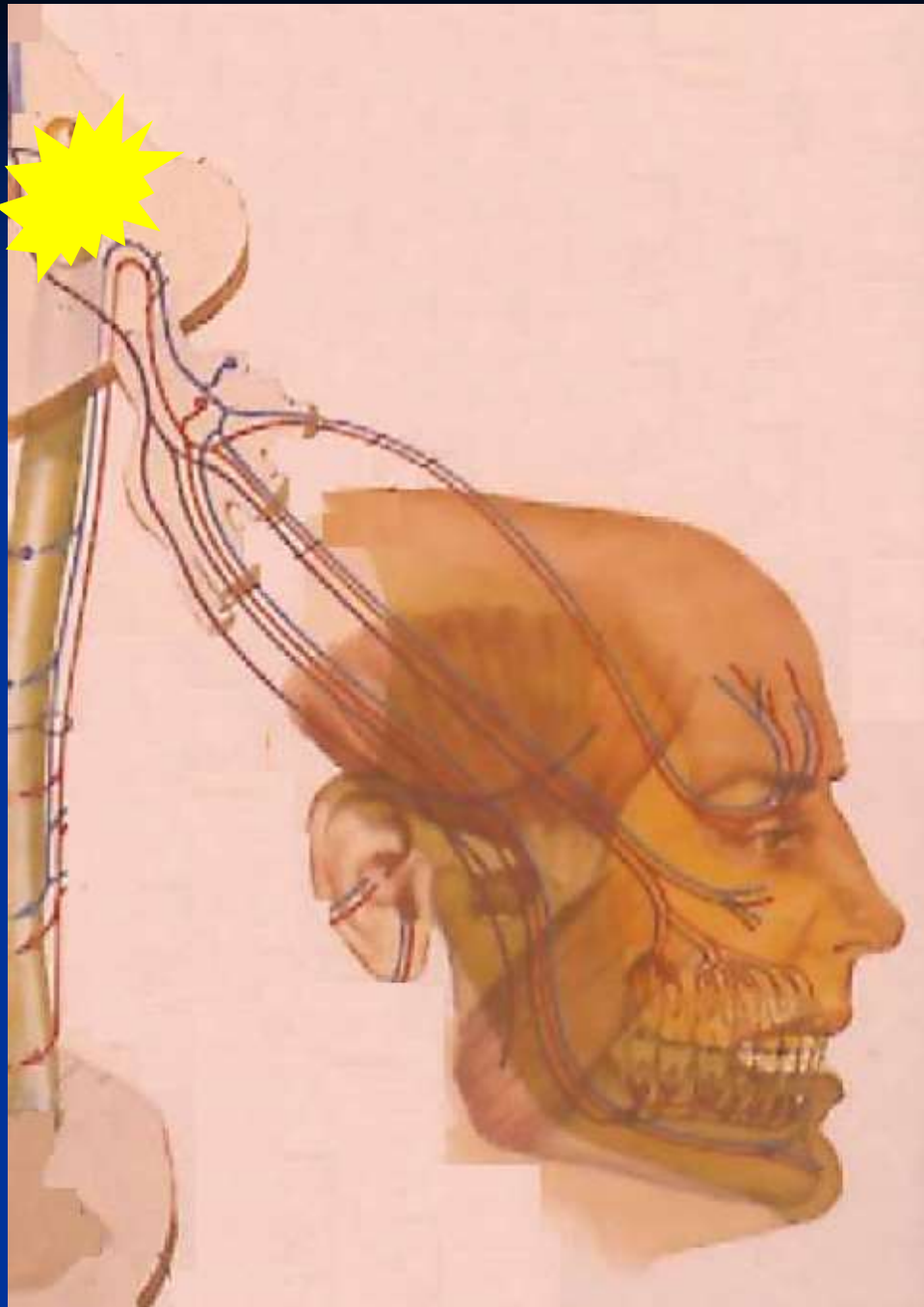
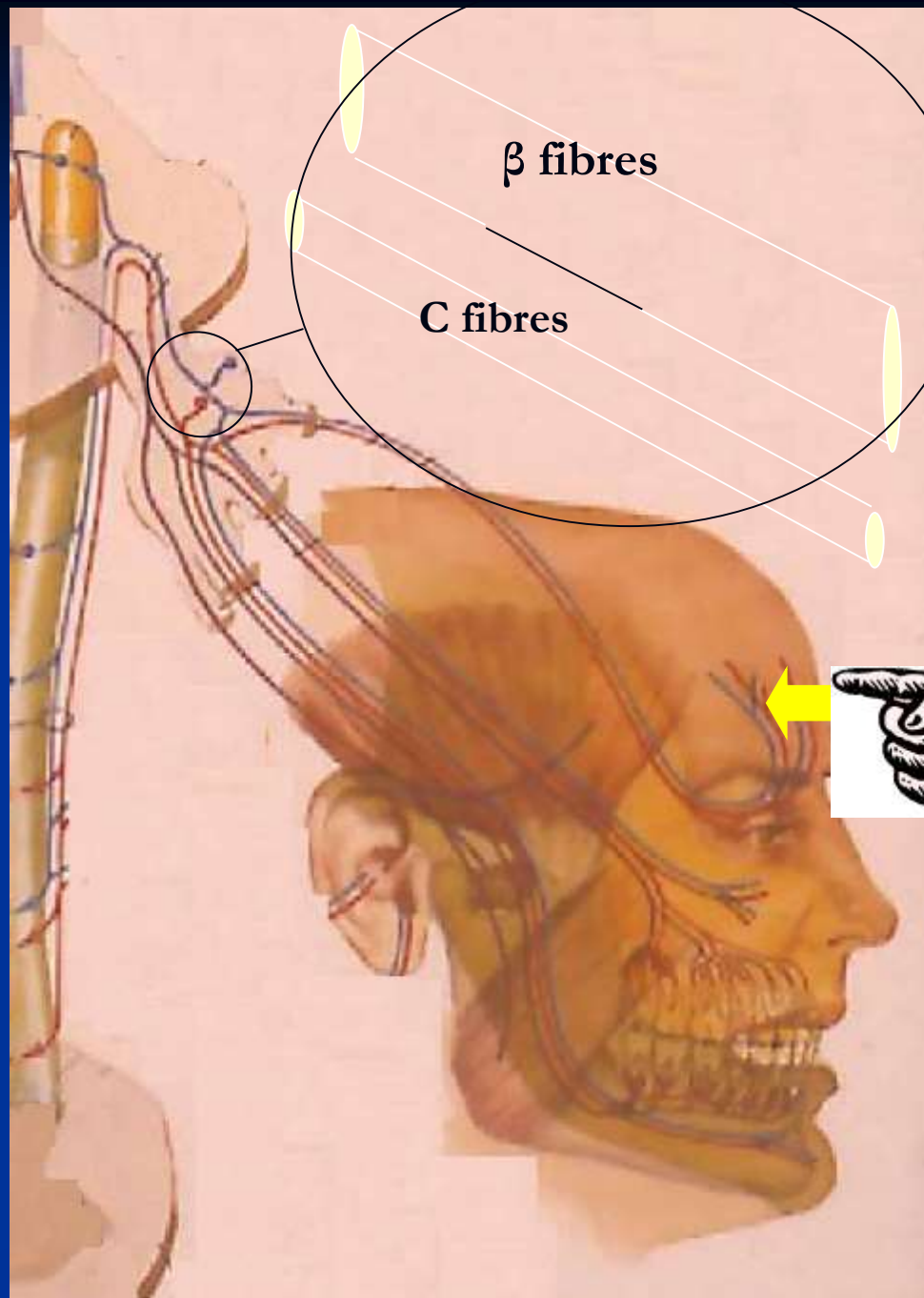
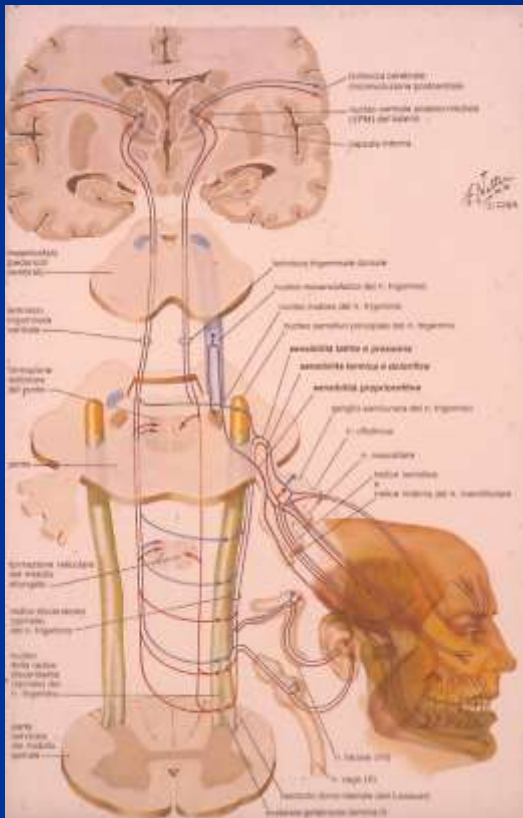
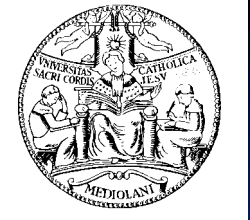
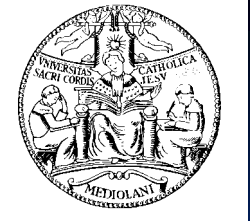
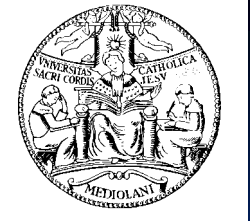
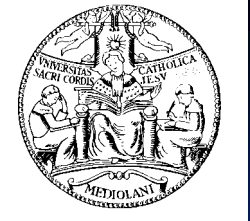
β fibres

C fibres

SURGICAL TREATMENT OF TRIGEMINAL NEURALGIA

Lesional procedures

- Thermocoagulation of the Gasserian Ganglion
- Neurolysis with glycerol
- Percutaneous microcompression
- Stereotactic radiosurgery

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III
SC
V1
IV
GR
V2
G
PT
RP
AF
TO
V3
IX
X
XI

FORAMEN OVALE

CAROTID CANAL

JUGULAR FORAMEN

Pars Venosa

Pars Nervosa

CCIPITAL
ONDYLE

Floor Sella

0

5 mm

10 mm

15 mm

Electrode

Clivus

ANATOMY

TRIGEMINAL GANGLION and POSTERIOR ROOTLETS

V1

V2

V3

Trigeminal Ganglion

Dural Sac

Pars Compacta

Arachnoid

Trigeminal Cistern

Needle
5mm
Tip (uninsulated)

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SURGICAL TREATMENT OF TRIGEMINAL NEURALGIA

Non lesional procedures

Microvascular decompression of the CN V root

falce cerebrale (sezionata)
v. oftalmica superiore
plesso basilare
seno cavernoso
a. tentoriale
seni petrosi superiore ed inferiore
tentorio del cervelletto
seno retto
falce cerebrale (sezionata)
confluente dei seni
seno sagittale superiore

n. ottico (II)
seno intercavernoso (circolare) e ipofisi
a. carotide interna
seno cavernoso
seno sfeno-parietale
v. cerebrale media superficiale
n. oculomotore (III)
n. trocleare (IV)
n. trigemino (V)
v. meningea media
n. abducente (VI)
seno petroso superiore
v. petrosa
nn. faciale (VII) e intermedio
n. vestibolo-cocleare (VIII)
n. glosso-faringeo (IX)
n. vago (X)
foro giugulare
seno sigmoideo
n. accessorio (XI)
n. ipoglosso (XII)
seno trasverso
grande vena cerebrale (di Galeno)
sbocco di una v. cerebrale inferiore

falce cerebrale
seno sagittale inferiore
grande vena cerebrale (di Galeno)
seno sfeno-parietale
seno intercavernoso
seno petroso superiore
seno retto
seno petroso inferiore
seno sigmoideo
foro giugulare
seno trasverso
confluente dei seni
seno occipitale

F. Netter M.D.

Mozgové nervy v spojení s mozgovým kmeňom (pohľad zľava zhora). Ľavá polovica klenby lebky a mozgová hemisféra čiastočne odstránené. Zreteľná poloha ganglion trigeminale

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V dx

Casistica personale

642 pazienti

- 196 decompressioni vascolari microchirurgiche
- 308 microcompressioni percutanee del ganglio di Gasser
- 138 termocoagulazioni percutanee selettive del ganglio di Gasser

RESULTS EVALUATION

- Complete Pain Relief = no pain, no medication
- Partial Pain Relief = at least 50% of analgesia, medications needed
- Poor Pain Relief = less than 50% of analgesia, other procedures needed

MEAN FOLLOW-UP = 68 months

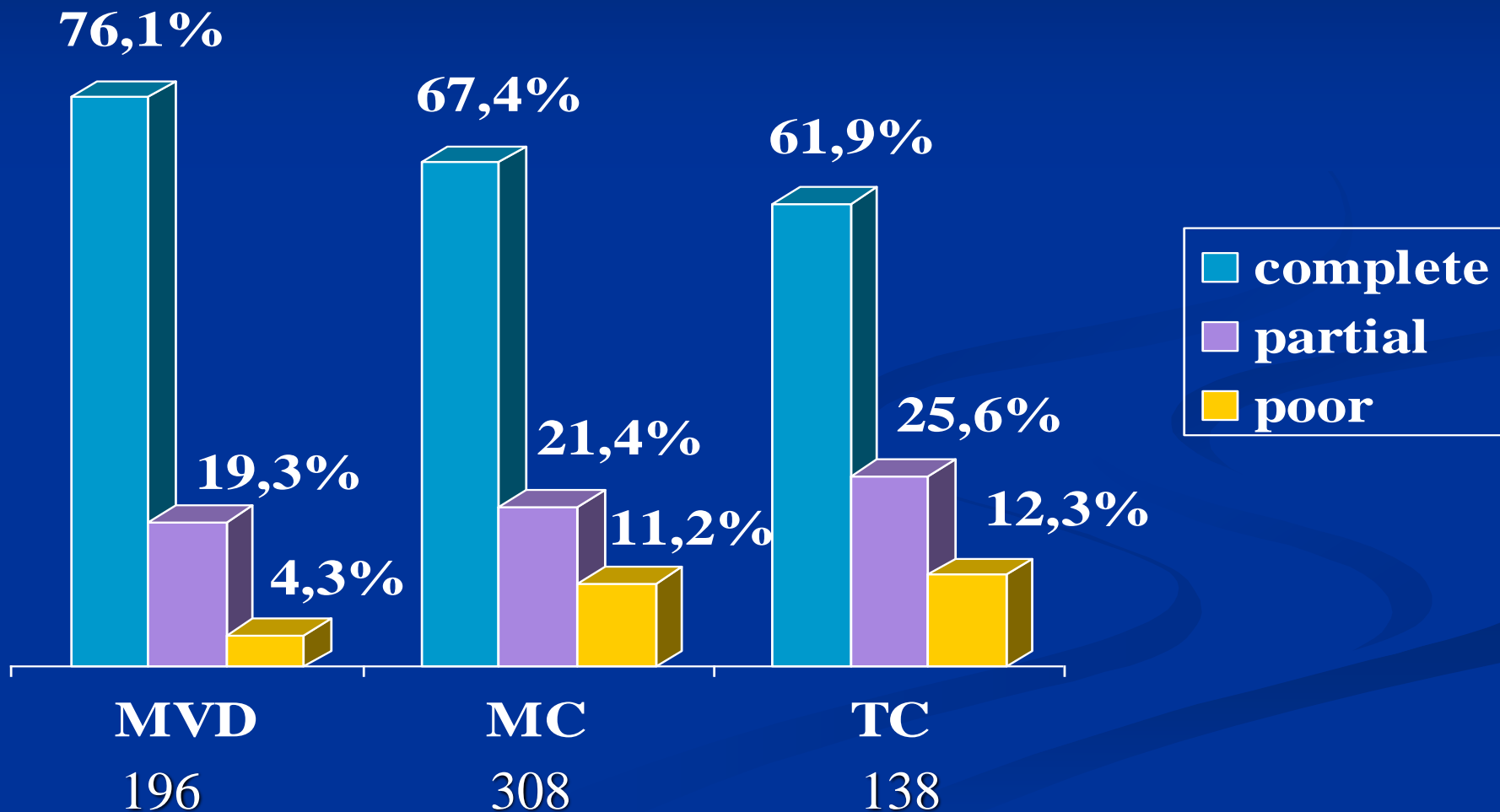
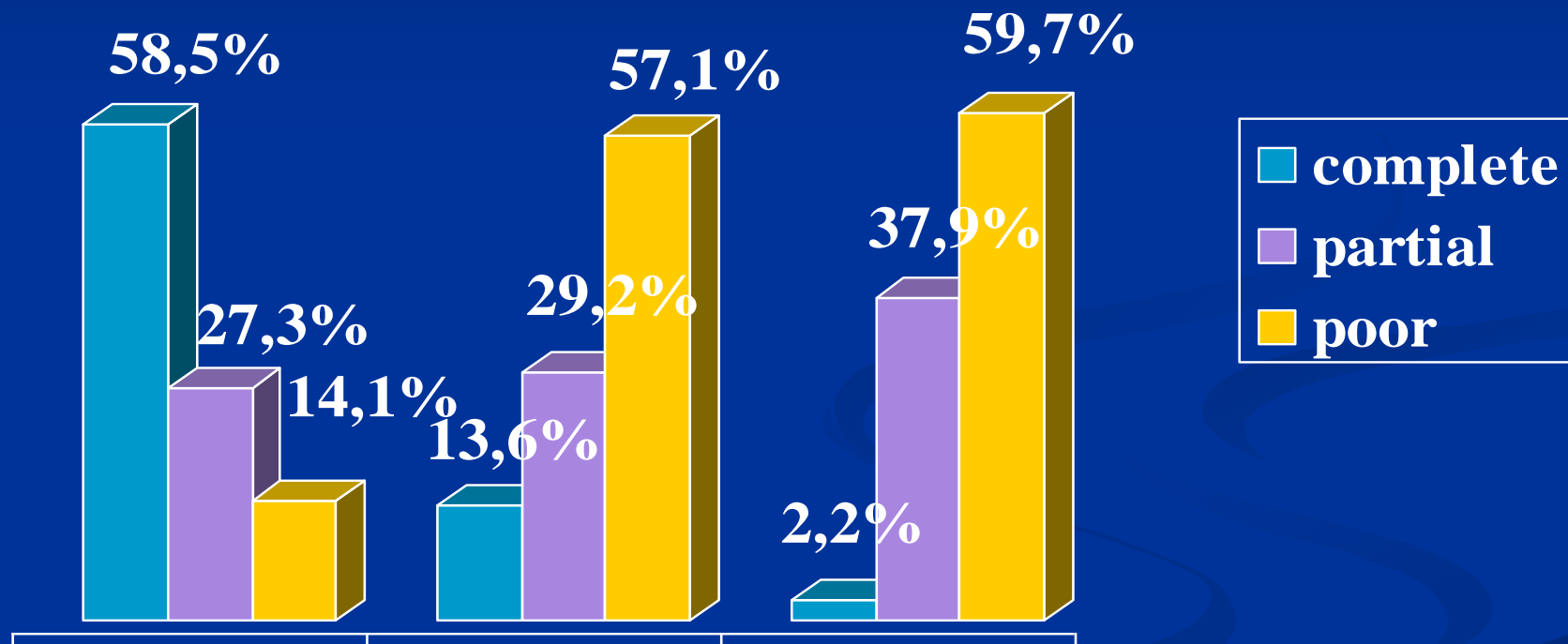
MIN 12 months

MAX 200 months

Meglio 2006

ACUTE RESULTS
(642 cases)

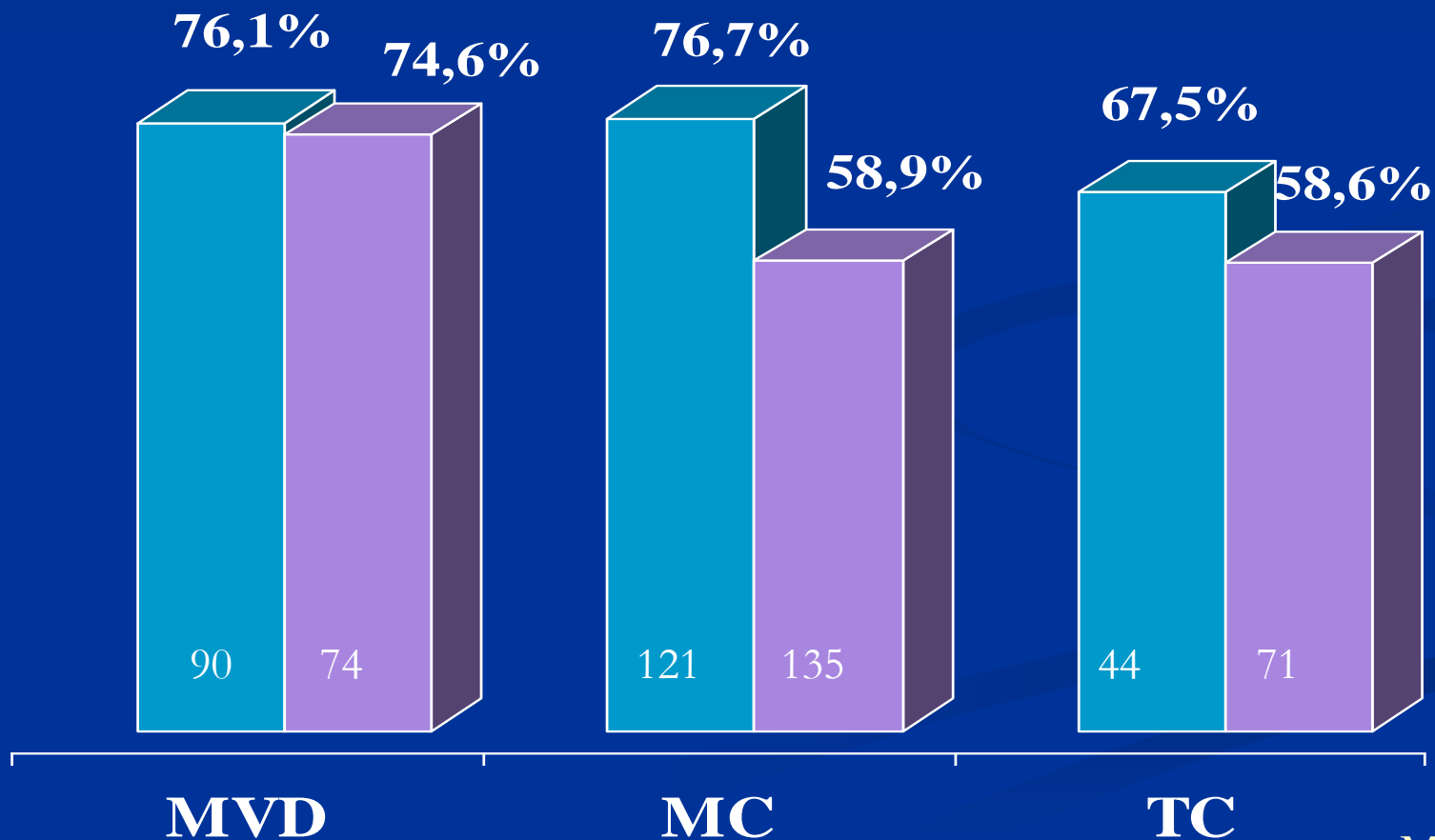
	MVD	MC	TC
	196	308	138
complete	76,1%	67,4%	61,9%
partial	19,3%	21,4%	25,6%
poor	4,3%	11,2%	12,3%

Meglio 2006

LONG TERM RESULTS (470 cases)

	MVD	MC	TC
Patients	144	216	110
Mean Follow Up	80	65,3	70,5

Meglio 2006

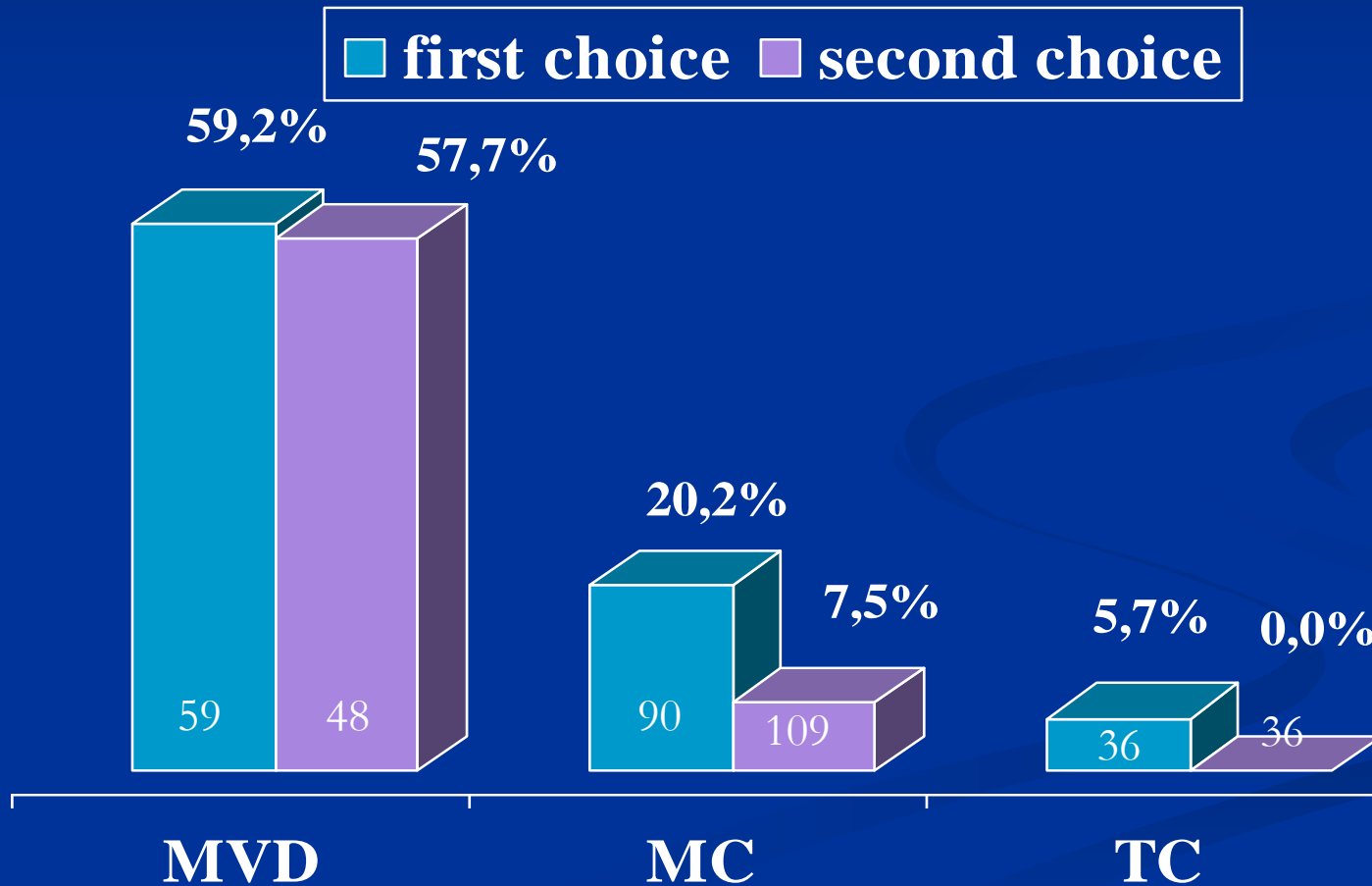
ACUTE RESULTS
MVD-MC-MT

76,1%
74,6%
76,7%
58,9%
67,5%
58,6%
90
74
121
135
44
71
MVD
MC
TC

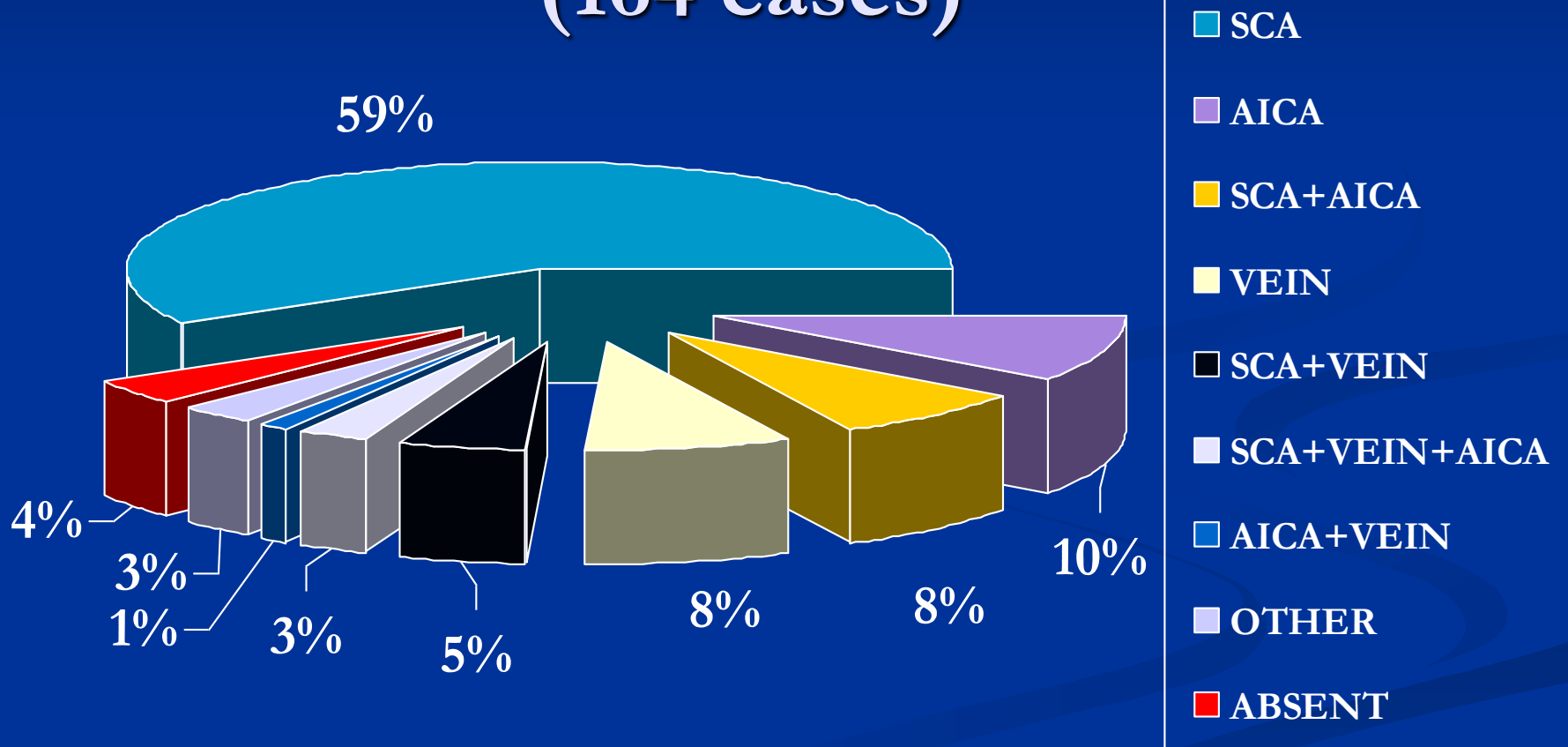
Meglio 2002

LONG TERM RESULTS
MVD-MC-TC

first choice | second choice

	first choice	second choice
MVD	59,2% (59)	57,7% (48)
MC	20,2% (90)	7,5% (109)
TC	5,7% (36)	0,0% (36)

Meglio 2002

MVD
Surgical findings
(164 cases)

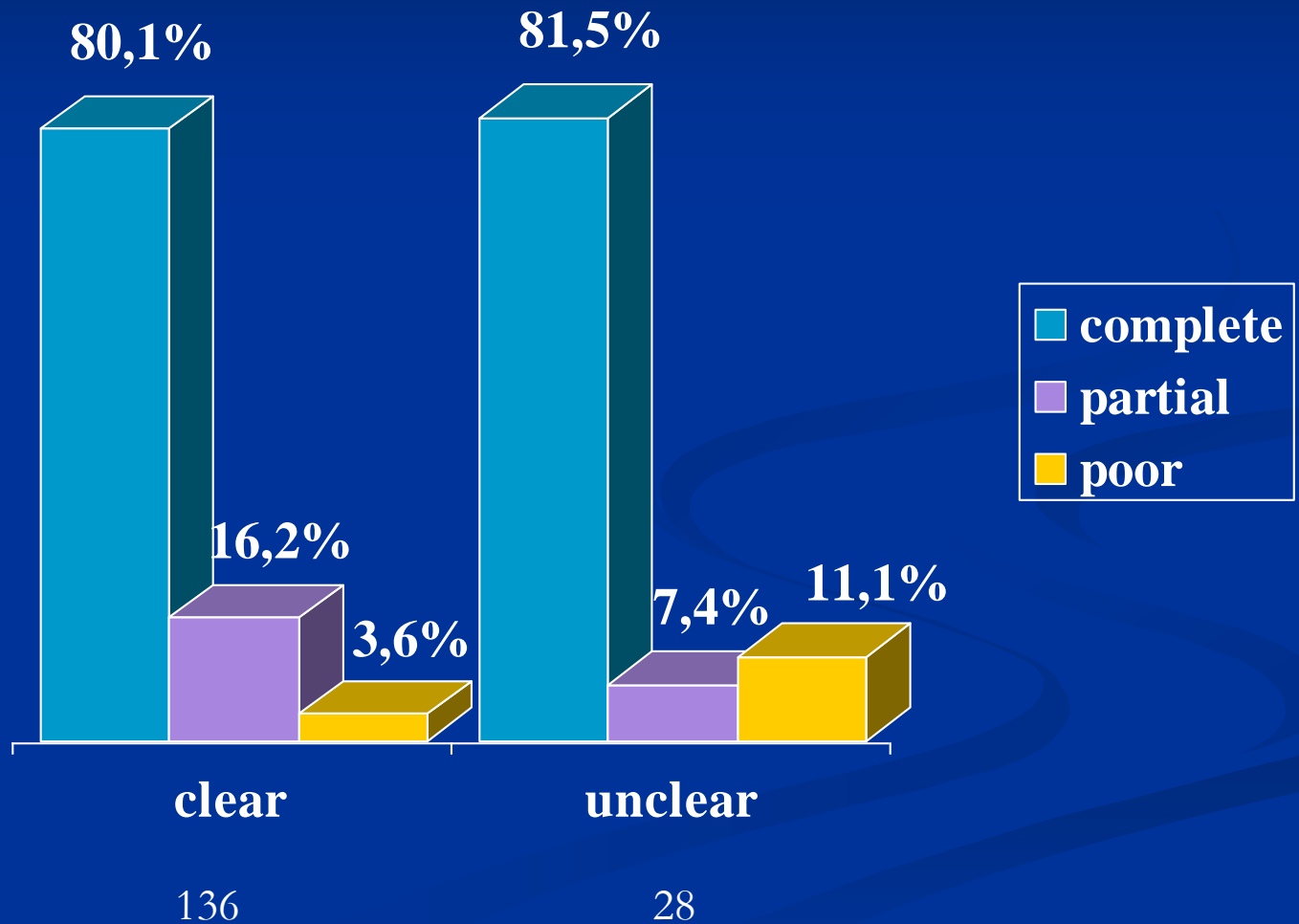
Finding	%
SCA	59%
AICA	10%
SCA+AICA	8%
VEIN	8%
SCA+VEIN	5%
SCA+VEIN+AICA	3%
AICA+VEIN	1%
OTHER	3%
ABSENT	4%

Meglio 2002

UNCLEAR NEUROVASCOLAR CONFLICT

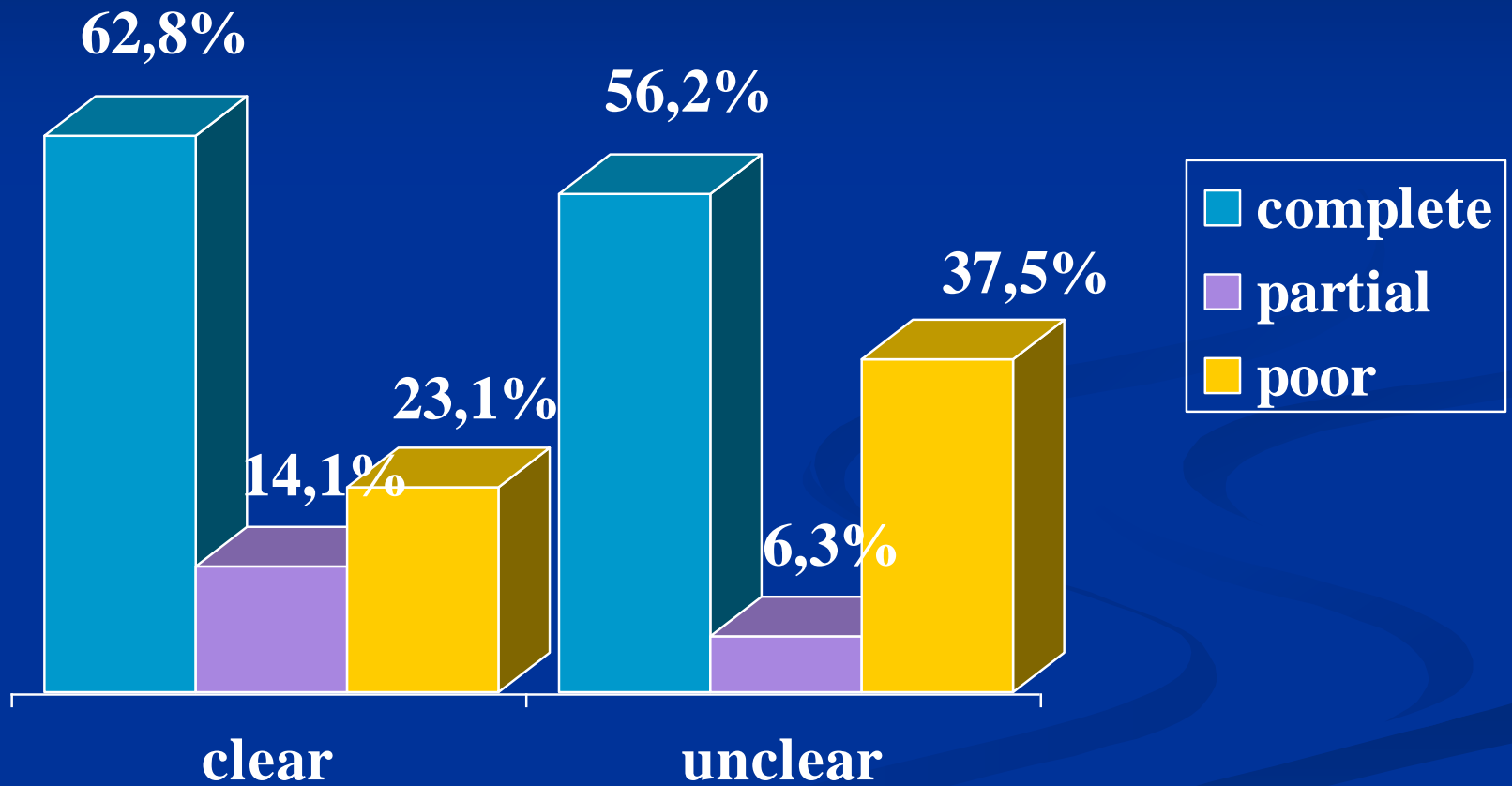
28 patients with no clear neurovascolar conflict

- 12 neurolysis of the V nerve
- 16 only exploration

Meglio 2002

ACUTE RESULTS
Type of compression

Patients 136 28

Meglio 2002

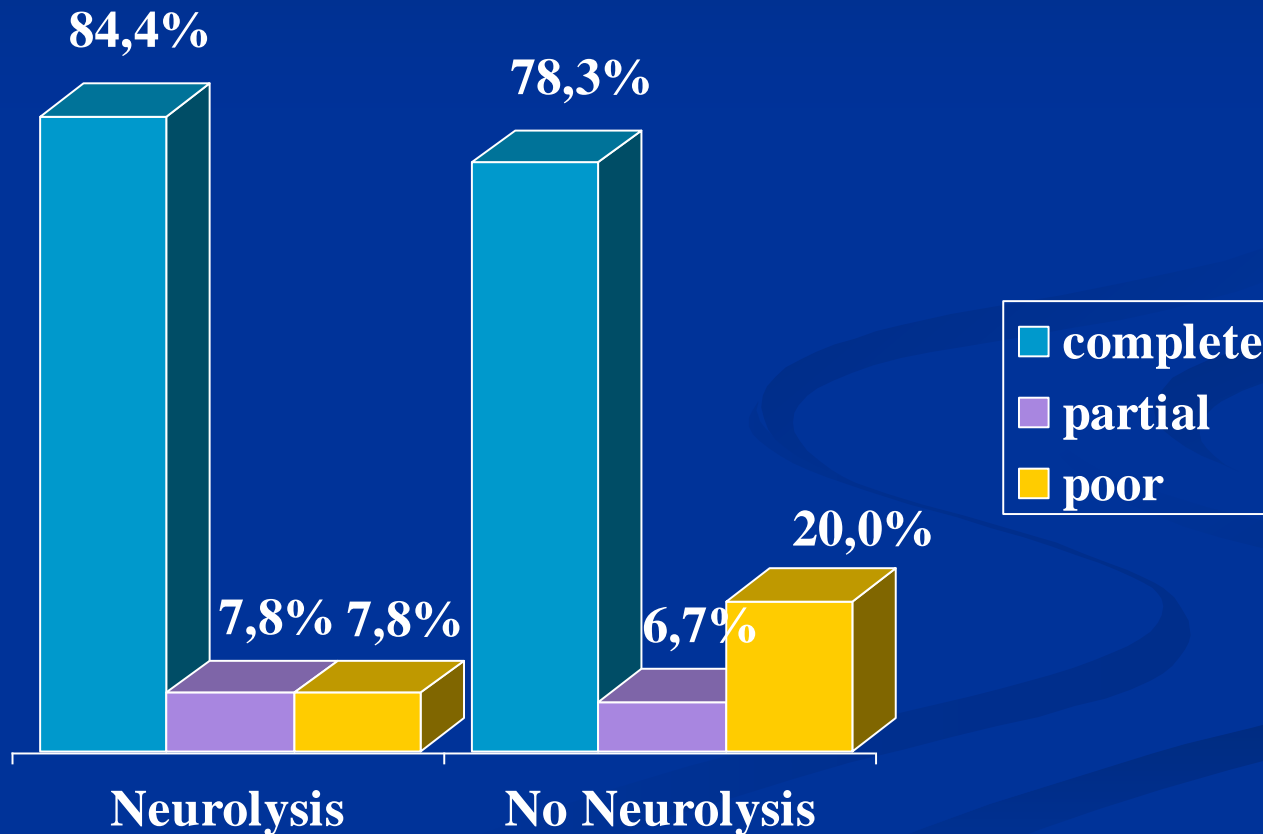
LONG TERM RESULTS
Type of compression

Patients 103 17

Lost: 44

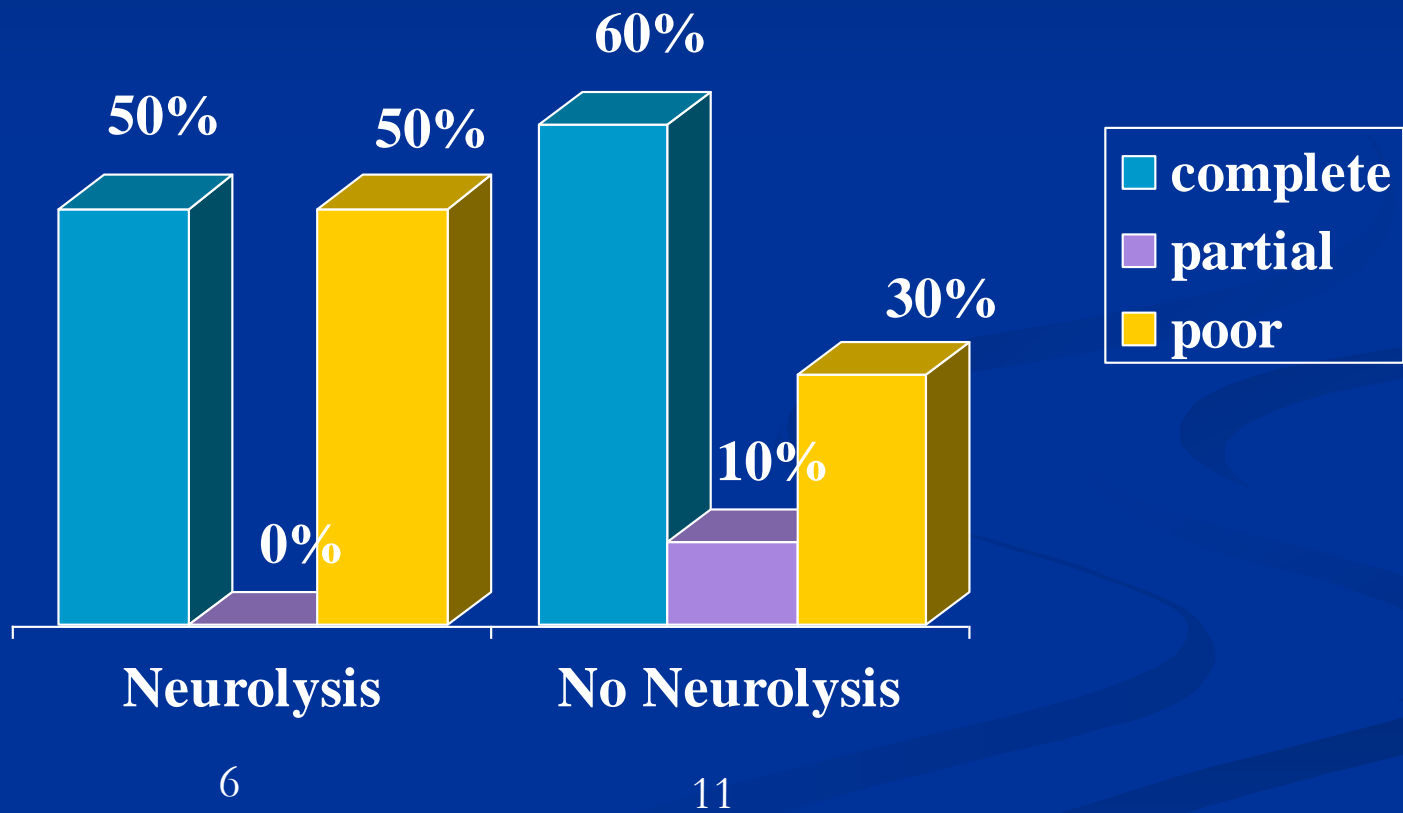
Meglio 2002

UNCLEAR NEUROVASCOLAR CONFLICT

Acute results

	complete	partial	poor
Neurolysis	84,4%	7,8%	7,8%
No Neurolysis	78,3%	6,7%	20,0%

Meglio 2002

UNCLEAR NEUROVASCOLAR CONFLICT

Long term results

Patients 6 11

Lost: 11

Meglio 2002

COMPLICATIONS
TC (138 cases)
8,69%

Dysesthesia	10 cases (7,2%)
Facial hematoma	1 cases (0,7%)
Motor deficit of V CN	1 cases (0,7%)

Meglio 2006

COMPLICATIONS
MC (308 cases)
9,4%

Dysesthesia	16 cases (5,1%)
Intraoperative hemmorhage	5 cases (1,6%)
Motor deficit of V CN	3 cases (0,9%)
Sepsis	1 case (0,4%)
Ageusia	1 case (0,4%)
Keratitis	1 case (0,4%)
Facial hematoma	2 case (0,4%)
Miocardial infarction	1 case (0,4%)

Meglio 2006

COMPLICATIONS
MVD (196 cases)
9,1%

IV CN deficit	2 cases (1%)
Trigeminal hypoesthesia	11 * cases (5,6%)
Trigeminal disesthesia	0
VII CN deficit	1 case (0,5%)
VIII CN deficit	4 ** cases (2%)

** permanent in 3 cases
* permanent in 2 cases

Meglio 2006

Trigeminal neuralgia
Mean time of recurrence

MVD	MC	TC
12,7	17,1	21,5

(months)

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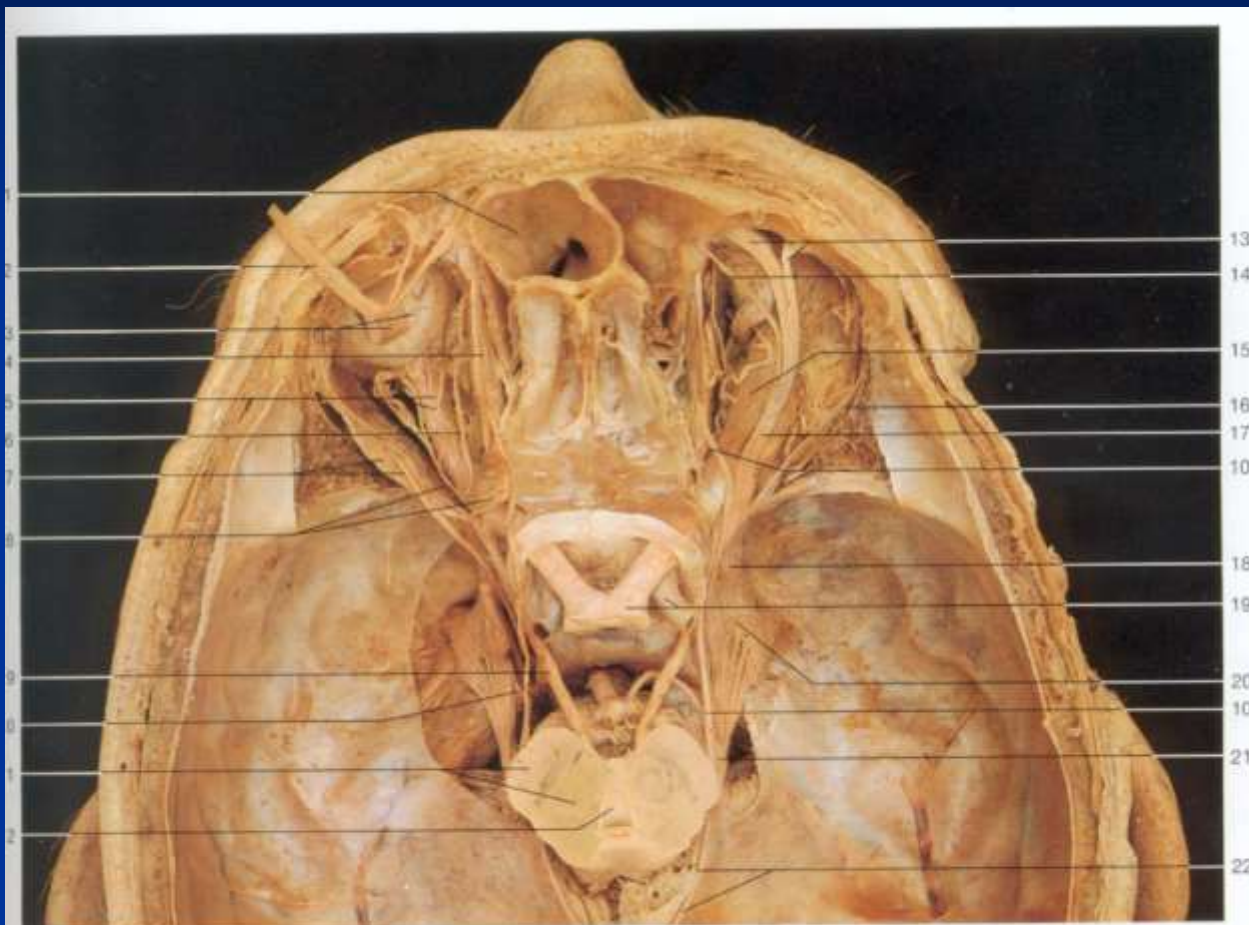
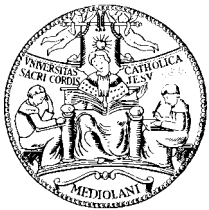
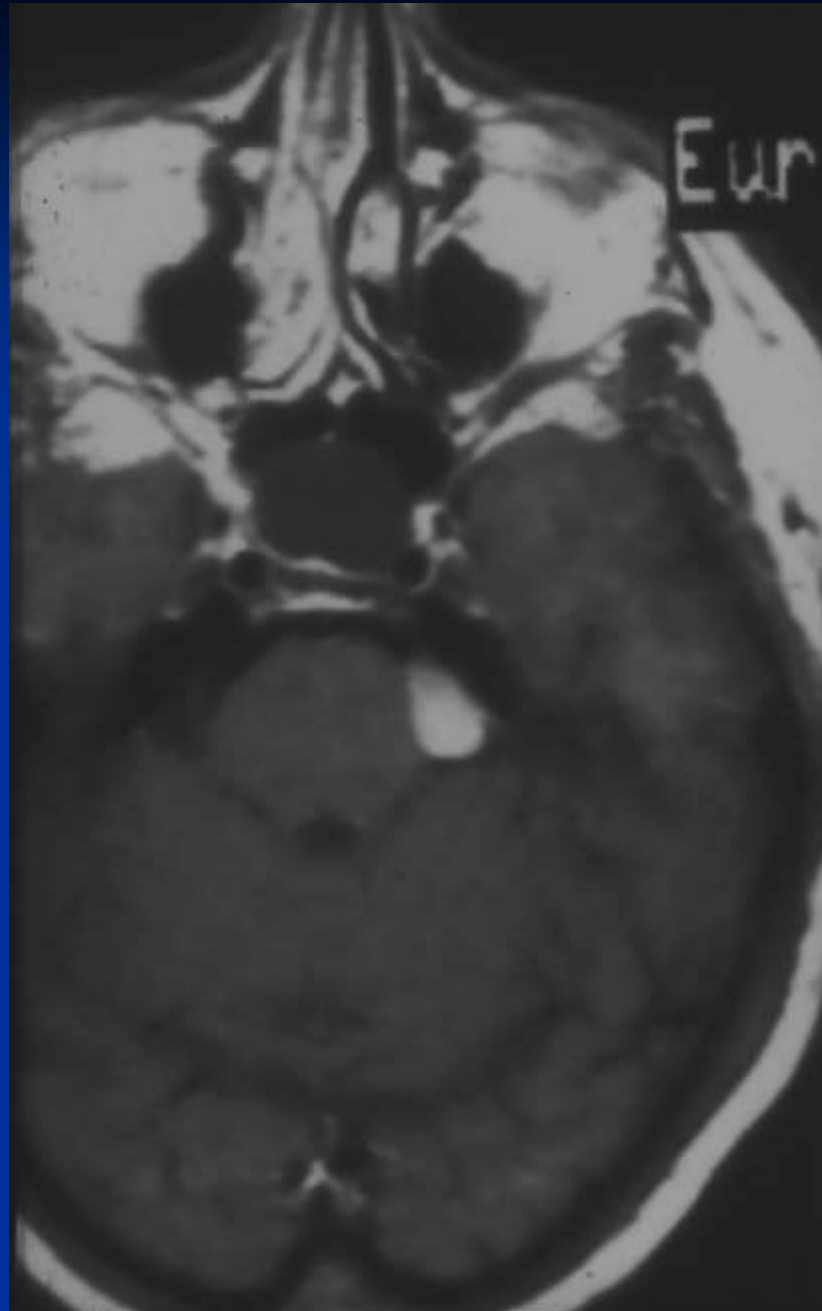
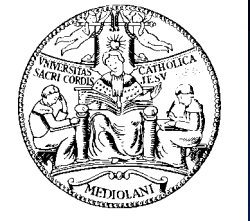
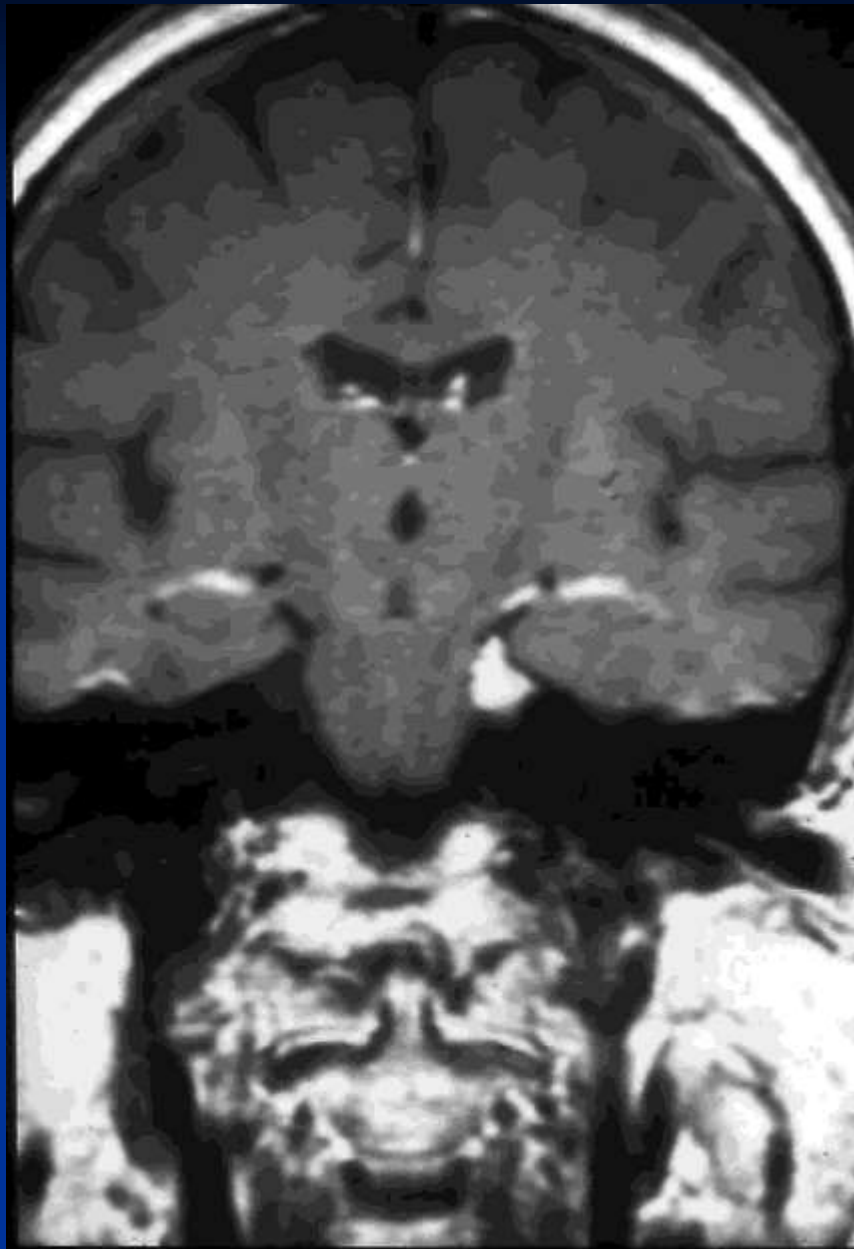
13
14
15
16
17
10
18
19
20
10
21
22

Mozgové nervy orbity (pohľad zhora). Vpravo — povrchová vrstva, vľavo — stredná vrstva útvarov očnice. V strope očnice vyrezané okienko, m. rectus sup. a n. frontalis prefaté a odklopené dozadu. Tentorium a dura mater čiastočne odstránené

< k strane 70

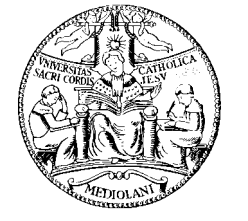
21 **n. abducens** (n. VI; prerezaný)
22 **n. trigeminus** (n. V)
23 ggl. trigeminale
24 **n. maxillaris** (n. V_2) a for. rotundum
25 **n. mandibularis** (n. V_3)
26 meatus acusticus ext.
27 nn. pterygopalatini
28 nn. temporales prof.
29 n. buccalis
30 n. massetericus
31 n. auriculotemporalis
32 trochlea a m. obliquus sup.

RADIOFREQUENCY

Series	Number patients	Acute results	Long term results
Broggi, 1990	1000	95%	18% recurrence at 9 yr.
Taha, 1995	154	99%	55%
Kanpolat, 2001	1600	97,6%	57,7% after 5 yr. 52,3% after 10 yr. 41% after 20 yr.
Tronnier, 2001	206	83%	50% after 2 yr.

MICROCOMPRESSION

Series	N. patients	Acute results	Long term results
Peragut et al, 1991	70	97,5%	77,5%
Abdennebi et al, 1997	200	-	62,5%
Correa and Teixeira, 1998	158	90%	20% recurrence at 7 yr.
Skirving et al, 2001	496	98,1%	80,8% within 5 yr. 68,1% within 10 yr.
Shih-Tseng,2003	80	100%	95%at 1yr
Brown and Pilitsis, 2005	56	92%	85% at 2 yr
Pollock, 2005	112	93%	72% at 3 yr

MICROVASCULAR DECOMPRESSION

Series	Number patients	Acute results	Long term results
Piatt and Wilkins, 1984	103	-	77%
Bederson e Wilson, 1989	252	-	83%
Jannetta et al, 1995	1185		70% after 10 yr.
Klun, 1992	178	94%	84%
Broggi et al, 2000	148	-	84,7%
Tronnier et al, 2001	225	89%	64% after 20 yr.
Tyler-Kabara et al, 2002	2003	80%	73% at 5 yr.
Theodosopoulos et al, 2002	420	87%	72% at 5 yr.
Ashkan, 2004	80	99%	25,5% at 30 mth
Shi-Ting et al, 2005	45	97.8%	93,3%
Pollock, 2005	55	-	72% at 3 yr

	Patients (%)					
	Percutaneous Techniques				Posterior Fossa Exploration	
	Radiofrequency Rhizotomy (Curved Electrode) (n = 500)	Radiofrequency Rhizotomy (n = 6205)	Glycerol Rhizotomy (n = 1217)	Balloon Compression (n = 759)	Microvascular Decompression (n = 1417)	Partial Trigeminal Rhizotomy (n = 250)
Procedure completed	100	100	94	99	85	100
Initial pain relief	98	98	91	93	98	92
Success of procedure	98	98	85	92	83	92
Pain recurrence	20	23	54	21	15	18
Facial numbness	98	98	60	72	2	100
Minor dysesthesia	9	14	11	14	0.2	5
Major dysesthesia	2	10	5	5	0.3	5
Anesthesia dolorosa	0.2	1.5	1.8	0.1	0	1
Corneal anesthesia	3	7	3.7	1.5	0.05	3
Keratitis	0.6	1	1.8	0	0	0
Trigeminal motor dysfunction	7	24	1.7	66	0	0
Permanent cranial nerve deficit	0	0	0	0	3[a]	
Perioperative morbidity	0.6	1.2	1	1.7	10[a]	
Intracranial hemorrhage or infarction	0	0	0	0	1[a]	
Perioperative mortality	0	0	0	0	0.6[a]	

[a] **Combined values for microvascular decompression and partial trigeminal rhizotomy.**

Table 3. Results of Percutaneous Techniques and Posterior Fossa Exploration for Patients Treated for Trigeminal Neuralgia (Taha and Tew, 1996)